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Ignoring the Elephant in the Room:
The Carbon Footprint of Climate Change Research

by Ryan K. Brook

DESPITE SOME ONGOING RAVING from a fringe minority of attention seekers and professional refuters funded by the oil companies, most scientists now accept that climate change is a reality and that human activity is the root cause (Intergovernmental Panel on Climate Change, 2007; Jacques et al., 2008). Many scientists have worked tirelessly to ensure the science is solid, and each new study contributes to understanding the big picture. In all of this, scientists should be immensely proud. Global efforts to convince the general public that climate change is a reality and that our collective actions need to change have been much less successful. Perhaps this failure stems from the misguided notion that climate change is really only an environmental issue, not a social problem.

It seems that while the general public is now much more aware of climate change and its potential impacts than ever before, perhaps the majority believe that global warming is still in debate and that scientists are far from reaching a consensus. For example, a recent poll in the United States found that only 41% of respondents blame global warming on human activity. Even worse, despite some important success stories, there has been a global failure to respond with real reductions in carbon dioxide output. In 2008, a poll of 12 000 citizens in 11 countries, including Canada, found that only 47% were prepared to make personal lifestyle changes to reduce carbon emissions, which is actually a decrease from the 58% willing to do so in 2007. Canada signed and ratified the Kyoto Accord with strong public support, yet it has failed miserably in reaching even these modest goals (United Nations Framework Convention on Climate Change, 2009). The United States, on the other hand, signed and then promptly ignored Kyoto. Some European countries have led inspirational initiatives, and there are definitely some bright lights throughout the world, but globally we are losing the battle to control carbon output. Badly.

If the science of climate change is so compelling and the risks of maintaining the status quo are so overwhelming (Intergovernmental Panel on Climate Change, 2007), why is the message not translating into meaningful action? One reason, I believe, is that the scientists sounding the alarm are, in fact, part of the problem because we are saying "Do as I say, not as I do." Scientists who study climate change, especially in the polar regions, have large carbon footprints themselves. By not openly discussing this issue and actively addressing it, we seriously undermine our credibility and our message. Of course, there is no question that the science is absolutely essential and that the data generated will have significant positive impacts on our understanding of climate change and development of policy and mitigation strategies. But it is increasingly difficult to make a convincing case for how serious the problem is when we, ironically, are doing little to reduce our own research-related carbon footprint. Perhaps most troubling is the almost total absence of dialogue among researchers on this issue.

FIG. 1. Field research by aircraft, especially helicopters, produces a very large carbon footprint. This Robinson 44 uses half the fuel of the similar-sized Bell 206 Jet Ranger.

I think we are generally aware of the vast amount of carbon our research produces, but most of us have not done much to reduce our CO_2 production or even calculated its amount. Like most scientists working in polar regions, I travel a great deal throughout the Arctic to do research and teaching, as well as to conferences and meetings in the south. Recently a student of mine calculated the carbon footprint for a course I teach in the Arctic, and the numbers were sobering. For a research team of 20 people, calculating only the propane and gasoline used in our remote camp on the Hudson Bay coast for one week and the helicopter fuel needed for the short 40 km flights in and out, we produced 3500 kg of CO_2. For the purposes of this essay, I estimated my carbon footprint for helicopter and fixed-wing aircraft

FIG. 2. Remote Arctic field camps at a) Daring Lake in the Northwest Territories and b) Nester One on the Hudson Bay coast of Manitoba have decreased their carbon footprint by using solar and wind power.

use, including commercial travel to get north and travel to four North American conferences annually over the last decade. On average, I have produced 8300 kg of CO_2 per year through research alone. I suspect that my total is about average, if not on the low side, compared to other researchers. For comparison, the average citizen living in Toronto produces about the same amount of CO_2 per year in daily life (8600 kg) as I do in my research alone. In the global picture, the total amount of CO_2 produced by all scientists is relatively small, but it is the perceptions created by scientists who travel extensively in helicopters, planes, and large ships to do research that has an influential impact on the general public and their willingness to make personal changes. An important first step is calculating our individual research footprint; a far more challenging step is to do something about it.

How can we argue to the world that reducing CO_2 output is so important if we are not willing to undertake change on our own? Yet how can we reduce our use of fossil fuels while still conducting research and monitoring in the North? Clearly these are not easy questions to answer, but it is time to start thinking and talking about them. The International Polar Year (IPY) has led to a vast number of training opportunities for graduate students who will form the next cohort of northern scientists. I fear that the science community as a whole is not doing enough to recognize the impacts that we are having through our research activities, and there is an immediate need to identify ways to reduce our negative impacts and take ownership of the issue. Will our inaction result in future scientists who also ignore the issue and do nothing?

FIG. 3. Community-based monitoring provides many benefits to research, which include lowering the carbon footprint of a project by minimizing the travel of southern scientists to field sites. Here, Greg Lundie of Churchill, Manitoba, measures the active layer of permafrost at monitoring sites along the Hudson Bay coast.

Lately, I have been raising the issue of carbon footprints and what should be done about them with colleagues, but surprisingly, carbon production from research and the possibility of offsets doesn't seem to be on the radar of many. When I inquired about buying offsets, most were quick to dismiss them as a sham. Indeed, there do seem to be some issues with offsets, and it is clearly more effective to deal with emissions at the source rather than absorb them later or stop them somewhere else (Wright, 2007; Galik and Jackson, 2009). But offsets are one tangible way to start at least discussing the issue and working toward viable solutions. I also inquired several times to the Natural Sciences and Engineering Research Council of Canada, the Social Sciences and Humanities Research Council of Canada, and the Canadian Institutes of Health Research to seek some leadership on this issue, but of these only NSERC responded and had no advice, ideas, or support to offer. Unfortunately, as far as I can tell, there is virtually no general dialogue or leadership on the issue of researchers' carbon footprints. It would seem that the leadership will have to come from within.

When I talked with a colleague in the ecotourism industry, who also has a large carbon footprint, it quickly became

clear that many in the tourism industry are way out front on this issue. He had built offsets into programs and said that cap-and-trade requirements will soon become a part of how business is usually done. The David Suzuki Foundation has already produced a comprehensive, practical guide to help businesses reduce and offset greenhouse gas emissions (David Suzuki Foundation, 2008), and many similar resources are available worldwide. The World Business Summit on Climate Change, held in Copenhagen at the end of May 2009, also planned to emphasize discussions on low-carbon options for business and facilitate conversation regarding business action on climate impacts (Copenhagen Climate Council, 2009). So if the business sector can become organized around quantifying and mitigating carbon footprints, what can the science community do to catch up? Better yet, what might we do to become leaders in this?

Scientists could begin to provide leadership on this issue by sharing data about their carbon footprints and perspectives on how to reduce them. We can also share our collective experience in ways to minimize reliance on fossil fuels during travel and fieldwork, as there have been some important success stories (Figs. 1 and 2a, b). We can also minimize the number and extent of our trips and work collaboratively with northern communities to collect the data we need (Fig. 3). The International Polar Year has facilitated much greater collaboration with northern people and has built capacity for community-based research and monitoring. Meetings held using video-conferencing and other technologies can both lower carbon output and save money. The year 2009 may be an important milestone in climate change action, with the United Nations Climate Change Conference fast approaching. This conference, to be held in Copenhagen in December, represents an exciting opportunity for scientists to emerge as leaders, not only in the science of climate change, but also in the process of recognizing and reducing carbon footprints.

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